

Lavon Reservoir

2018 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Lavon Reservoir were surveyed in 2018 using electrofishing and trap netting and in 2019 using gill netting. Anglers were surveyed from June 2017 through May 2018 with a creel survey. Historical data are presented with the 2017-2019 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Lavon Reservoir is a 21,400-acre impoundment located on the East Fork Trinity River approximately 8 miles east of McKinney. Water level has fluctuated widely in the last decade yet has remained above or near the conservation elevation (492 feet above mean sea level) since 2015. Lavon Reservoir has moderate productivity. Habitat features consisted mainly of riprap along the dam and railroad bridges, dead trees and stumps, and rocky shoreline. Standing dead timber is prevalent in the upper reservoir. Aquatic vegetation is limited due to extreme water-level fluctuations. Some American lotus and water willow was present in 2018.

Management History: Important sport fishes include White Bass, Largemouth Bass, crappie, and catfish. All species are managed with statewide regulations. Florida Largemouth Bass were stocked in 2017 to take advantage of habitat provided by high lake levels. We cooperated with U. S. Army Corps of Engineers (USACOE) in posting signage and ramp stencils warning lake visitors of the potential for zebra mussel introductions. Utilizing media outlets and speaking engagements, we provided our constituents and user groups this same information. Portland samplers (Marsden 1992) deployed in the reservoir were monitored and a physical search for zebra mussel colonization was conducted in 2018. District staff served on a committee to develop a Watershed Protection Plan for Lavon Reservoir.

Fish Community

- **Prey species:** Threadfin Shad and Gizzard Shad were present in moderate abundance and available as prey to most fishes. Bluegill and Longear Sunfish were abundant and provide a good prey base to sport fishes.
- **Catfishes:** Blue Catfish abundance continued to increase. Channel Catfish were collected although catch rates remained low.
- **Temperate basses:** White Bass catch rate increased two-fold over the previous catch of record. Yellow Bass were also numerous.
- **Largemouth Bass:** Catch rate of Largemouth Bass was twice the historical average. Spawning success in recent years has increased the number of young fishes in the reservoir.
- **Crappie:** White Crappie were abundant with many legal-size fish available to anglers. Black Crappie were also present in lower abundance.

Management Strategies: Inform the public about the negative impacts of aquatic invasive species. Conduct general monitoring surveys with trap nets, gill nets, and an electrofishing survey in 2022-2023. Access and vegetation surveys will be conducted in 2022.

Introduction

This document is a summary of fisheries data collected from Lavon Reservoir in 2017-2019. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2017-2019 data for comparison.

Reservoir Description

Lavon Reservoir is a 21,400-acre impoundment constructed in 1953 on the East Fork Trinity River. The reservoir is in Collin County approximately 8 miles east of McKinney and is operated and controlled by the USACOE. The original dam impounded 11,080 acres of water. In 1974, the dam was raised 12 feet which increased the surface area of the reservoir to 21,400 acres. Primary project purposes are municipal and industrial water supply, flood control, and recreation. To augment municipal and industrial water, Lavon Reservoir receives inter-basin transfers from Cooper and Tawakoni Reservoirs which are within the Sulphur and Sabine River Basins, respectively. Water is also pumped into Lavon Reservoir from the East Fork Raw Water Supply Project near Seagoville, TX. Lavon Reservoir also receives outfall from a regional sewage treatment facility. Lavon Reservoir was mesotrophic with a mean TSI chl-a of 39.30 (Texas Commission on Environmental Quality 2011). Habitat at time of sampling consisted of dead trees, rocks and boulders, riprap, and rocky interspersed with bare soil shoreline. There were isolated patches of emergent vegetation and some native floating leaved vegetation near the upper end of reservoir. Native aquatic plants present were American lotus, water willow, and buttonbush. Water level has been at or near the conservation elevation since 2015 (Figure 1) following a prolonged drought and historical low lake levels. Other descriptive characteristics for Lavon Reservoir are in Table 1.

Angler Access

Lavon Reservoir has 16 public boat ramps (Table 2), although most are subject to periodic closures by the USACOE due to water level fluctuations or maintenance. An up-to-date status of USACOE parks and boat ramps is available at <http://www.swf-wc.usace.army.mil/lavon/>. Boat ramp characteristics appear in detail in Table 2. Shoreline access to Lavon Reservoir is substantial and unlimited unless posted.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Hysmith and Moczygemba 2015) included:

1. Recommend incorporating improvements in the sport fishery on the TPWD web site.

Action: Updates were provided to the TPWD webmaster.

2. Continue zebra mussel monitoring, work with the USACOE to maintain signage and educate the public about invasive species.

Action: Portland samplers were monitored during a 2017-2018 creel survey, and a physical survey for adult zebra mussels was conducted in 2018. Signage and boat ramp stencils have been maintained.

Harvest regulation history: Sportfish in Lavon Reservoir are managed with statewide regulations. Current regulations are found in Table 3.

Stocking history: Lavon Reservoir was last stocked in 2007 and 2008 with Striped Bass at 13/acre. Stockings were conducted to try and establish an additional broodfish collection site. Florida Largemouth Bass were stocked in 2017. The complete stocking history is in Table 4.

Water transfer: Raw water is pumped into Lavon Reservoir from Cooper Reservoir, Tawakoni Reservoir, and the East Fork Raw Water Supply Project near Seagoville, TX. Until 2009, water was pumped from

Texoma Reservoir to Sister Grove Creek, a tributary of Lavon Reservoir. However, this transfer has been replaced by a direct pipeline from Texoma to the North Texas Municipal Water District facility in Wylie, Texas.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Lavon Reservoir (TPWD unpublished). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (2 hours at 24, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 13 randomly-selected fish (range 13.0 to 14.9 inches).

Trap netting – Crappie were collected using trap nets (15 net nights at 15 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn). Ages for White Crappie were determined using otoliths from 13 randomly-selected fish (range 9.0 to 10.9 inches).

Gill netting – Blue Catfish, Channel Catfish, White Bass, and Yellow Bass were collected by gill netting (10 net nights at 10 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn). Ages for Blue Catfish were determined using otoliths collected from 12 randomly-selected fish (range 11.0 to 12.9 inches). Ages for White Bass were determined from 13 randomly-selected fish between 9.0 and 10.9 inches.

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – An annual roving creel survey was conducted from 2017 through 2018. The creel period was June through May. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Habitat – A structural habitat survey was last conducted in 2014. A vegetation survey was conducted in 2018. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2017).

Water level – Source for water level data was the United States Geological Survey (USGS 2019).

Results and Discussion

Habitat: Littoral zone habitat consisted primarily of rocky shoreline and dead timber with some native aquatic vegetation (Table 6) in the form of water willow and American lotus. Buttonbush can provide substantial shoreline habitat during high water periods, which have been more common since 2015. Past water level fluctuations have severely limited the amount of aquatic vegetation in Lavon Reservoir, although some marginal vegetation was present in 2018.

Creel: An inaugural creel survey was conducted in 2017 and 2018 to establish baseline data for fisheries management decisions. Directed fishing effort by anglers was highest for crappie (39.0%), followed by anglers fishing for catfish (28.4%). Twelve percent of anglers targeted “anything” (Table 7), and only 9.8% of Lavon anglers targeted Largemouth Bass during the creel period.

Prey species: Catch rates of Gizzard Shad (195.0/h) and Threadfin Shad (54.0/h) were moderate, and not as high as catch rates during drought conditions. The majority of Gizzard Shad were available as forage to sportfish (IOV = 89; Figure 2). The more moderate catch rate of Gizzard Shad was likely related to improved sportfish abundance due to consistent lake levels and recruitment in recent years. Bluegill catch rate (267.0/h) improved from previous surveys, approaching the catch of record in 283.5/h in 2010 (Appendix C). Most Bluegill were available as forage for sportfish (PSD = 11; Figure 3). A diverse sunfish fishery, including Longear Sunfish (85.0/h), provides additional forage for sportfish (Appendix A). Only two-percent of anglers targeted sunfish during the 2017/2018 creel survey (Table 7).

Catfish: Catfish were the second most popular species at Lavon Reservoir behind crappie, accounting for 28.4% of the angling effort (Table 7). Anglers harvested an estimated 22,456.1 Blue Catfish and 9,697.6 Channel Catfish during the creel period (Table 9; Figure 6). Gill net catch rate of Channel Catfish remains consistently low (1.5/nn); similar-to the long-term average catch rate of 2.0/nn (Appendix C). Catch rate of Blue Catfish was the highest on record (17.1/nn), and the population contains many harvestable size fish between 15- and 20-inches (Figure 5). Blue Catfish reached legal length (12-inches) in three years (N = 12) and body condition was above 90 for most size classes and up to 120 for larger catfish. Approximately 24% of Blue Catfish were 20-inches or larger and fish over 30-inches are available to anglers. Individuals up to 40-inches were caught by anglers during the creel survey (Figure 6). Twenty-three percent of legal-size catfish were released, suggesting some voluntary release of larger catfish may occur.

Temperate Bass: Gill net catch rate of White Bass was the highest on record (22.2/nn) in 2019, and suggests successful spawning occurred in recent years. White Bass reached legal length (10-inches) in 1.6 years (N=13; range= 1 - 2 years). White Bass PSD was 43, and 41% of fish were available for harvest (Figure 7). Anglers caught 2.8 fish per-hour of effort and harvested 1.2 fish per-acre during the creel survey (Table 10). White Bass were the 5th most sought-after sport fish species with 8.7% of anglers targeting this species (Table 7). Striped Bass were not collected in gill nets or reported caught by anglers during the survey period and have likely disappeared from the reservoir since stockings were discontinued in 2008. Yellow Bass were also relatively abundant (8.3/nn; Appendix A) in the reservoir.

Largemouth Bass: Catch rate of Largemouth Bass (93.0/h) approached twice the historical average of 54.1/h (Appendix A). Largemouth PSD-stock (51; Figure 9) was within the target range, and a large portion of sub-stock fish were collected suggesting excellent recruitment in recent years likely due to increased littoral habitat since 2015. Body condition was adequate ($W_r \geq 90$) for most sizes classes, and relative weight was over 100 for larger fish. Largemouth Bass reached legal length (14-inches) in 2.3 years (N = 13; range 1 – 3 years) indicating good growth.

Despite the improved bass population, directed effort (1.2 h/acre; Table 11) for Largemouth Bass was low relative to other Texas lakes. Angler catch rate was also low (0.4/h) considering limited pressure. Largemouth Bass was the 4th most popular fish behind anglers fishing for “anything” during the creel survey. Extreme lake level fluctuations prior to 2015 likely contribute to this reduced angling effort and success. Some harvest of Largemouth Bass by anglers targeting other species was observed during the creel survey (Figure 10).

White Crappie: Crappie were the most sought-after sport fish at Lavon Reservoir, with 39% of anglers targeting this species. Angler catch rate was high (2.9/h) for crappie during the creel survey. Anglers harvested approximately 83,000 crappies during the creel period (Table 12, Figure 12). Trap net catch rate of White Crappie (16.7/nn) and Black Crappie (1.3/nn) was consistent with previous years; although, less than the record total catch in 2014 (38/nn) for both species (Appendix C). Fifty-two percent of the crappie population was of legal length (10-inches) or larger (Figure 11), and PSD-stock was 79. White Crappie reached 10-inches in total length (legal size) in 1.3 years (N = 12; range: 1 -2 years).

Fisheries Management Plan for Lavon Reservoir, Texas

Prepared – July 2019

ISSUE 1: Fish populations in Lavon Reservoir, especially Blue Catfish, White Bass, and Largemouth Bass, have continued to improve.

MANAGEMENT STRATEGY

1. Update fishery improvements on the TPWD web site.
2. Promote fishing opportunities through media contacts and social media.

ISSUE 2: Habitat in the form of aquatic vegetation is limited in Lavon Reservoir, primarily due to frequent water level fluctuations. The lack of aquatic vegetation and littoral habitat may account for low directed effort for Largemouth Bass.

MANAGEMENT STRATEGY

1. Introduce native aquatic plant species.
2. Pursue opportunities to partner with stakeholders to conduct habitat improvement initiatives.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state. Portland samplers have been deployed in Lavon Reservoir and Sister Grove Creek to monitor the presence of zebra mussels.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, and other outreach materials so that they can in turn educate their customers.
3. Educate the public about invasive species using media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.
6. Monitor Portland samplers deployed in Lavon Reservoir.

SAMPLING SCHEDULE JUSTIFICATION:

Conduct general monitoring surveys in 2022 – 2023 with electrofishing, trap netting, and gill netting. Access and habitat surveys will also be conducted.

Objective-Based Sampling Plan and Schedule (2019–2023)

Sport fish, forage fish, and other important fishes

Important sport fish in Lavon Reservoir include Largemouth Bass, Crappie, Blue and Channel Catfish, and White Bass. Important forage species include Bluegill Sunfish, Longear Sunfish, Gizzard Shad, and Threadfin Shad.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass ranked fourth in popularity behind anglers fishing for “anything” at Lavon Reservoir in a 2017 and 2018 creel survey. Stable lake levels since 2015 have resulted in improved recruitment. Sampling once every four years to collect long-term monitoring trend data will allow for determination of any large-scale changes in the Largemouth Bass population that may spur further investigation.

Twenty-four randomly selected 5-min electrofishing sites will be generated in fall 2022; and, sampling will continue until a minimum of 50 stock-size fish are collected with an acceptable level of precision. The anticipated effort to collect at least 50 stock-size fish with RSE of CPUE-S ≤ 25 is 19 stations with 80% confidence. Thirteen Largemouth between 13.0 and 14.9 inches will be collected to estimate age at the minimum length limit (14 inches). Relative weight of Largemouth Bass ≥ 8 ” TL will be determined from their length/weight data (maximum of 10 fish weighed and measured per inch class).

Catfish: Catfish provide the 2nd most popular fishery at Lavon Reservoir. Catch rates are typically low for Channel Catfish; however, sampling to achieve trend data objectives for Blue Catfish should allow detection of large-scale changes in the Channel Catfish population.

Fifteen randomly selected gillnet stations will be sampled in 2023. The anticipated effort to meet an RSE of CPUE-S ≤ 25 and collect at least 50 Blue Catfish, and 13 fish between 11.0 and 12.9 inches (to estimate age at the MLL), is between 8 and 15 stations with 80% confidence. Additional net nights may be added if we determine objectives can be met with reasonable additional effort.

Crappie: Crappie are the most popular fishery at Lavon Reservoir. Black Crappie were first collected in 2006 and have slightly increased in abundance. Trend data on CPUE, size structure, age and growth, and body condition of Black Crappie and White Crappie will be collected with trap nets every four years to monitor trends in the population. We estimate that the effort required to meet sampling objectives (RSE of CPUE-S ≤ 25 and collect at least 50 stock-size fish) for both species to be between 10 and 15 net nights. This level of sampling should provide a sufficient number (13) of White and Black Crappie between 9.0 and 10.9 inches to estimate growth to legal length (10 inches). We plan to sample a minimum of 10 random shoreline trap net stations; however, an additional 5 net nights will be sampled if objectives are not met with the initial 10 sampling stations.

White Bass: White Bass are the 5th most sought-after fish at Lavon Reservoir. Gill net catch rates are variable for White Bass; however, spring gill net sampling to achieve objectives for Blue Catfish should provide enough data to detect large-scale changes in the White Bass population that may spur further investigation. Additional sampling may be conducted if we determine objectives can be obtained for Blue Catfish as well.

Sunfish and Shad: Bluegill Sunfish and Longear Sunfish, along with Gizzard and Threadfin Shad are the primary forage at Lavon Reservoir. We intend to collect trend data on abundance, size structure, and prey availability for forage species (along with sampling for Largemouth Bass) once every four years. Effort expended to achieve desired relative abundance estimates for Bluegill should be similar-to that required for Largemouth Bass.

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Tables and Figures

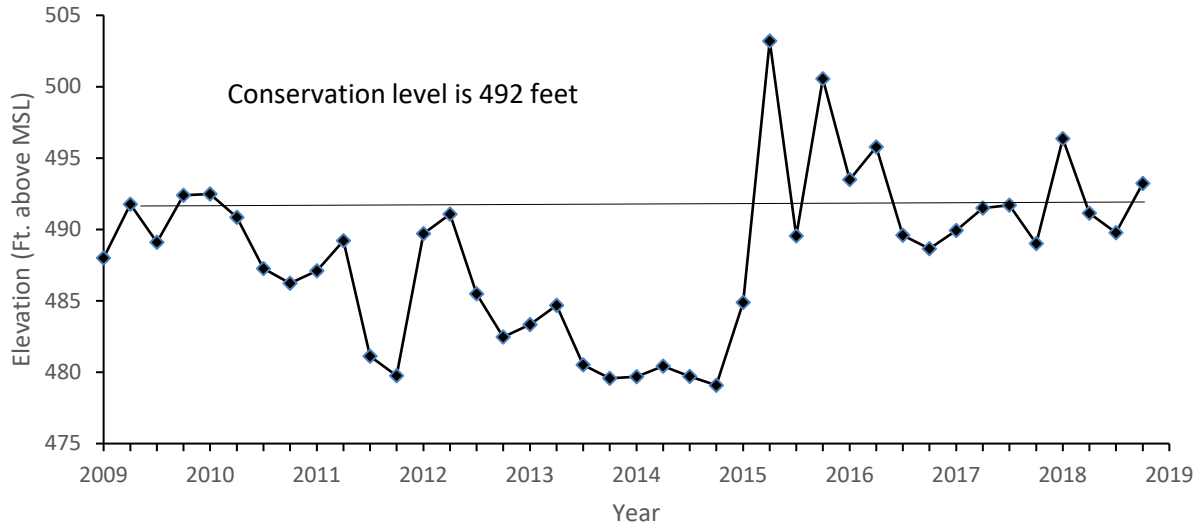


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lavon Reservoir, Texas.

Table 1. Characteristics of Lavon Reservoir, Texas.

Characteristic	Description
Year constructed	1953
Controlling authority	U.S. Army Corps of Engineers
County	Collin
Reservoir type	Mainstream: East Fork Trinity River
Shoreline Development Index	5.9
Conductivity	286 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for Lavon Reservoir, Texas, August, 2018. Reservoir elevation at time of survey was 493 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Twin Groves	33.16593 -96.44157	Y	40	490	Fair. Extension is not feasible
Caddo Park	33.16247 -96.41896	Y	30	490	Park closed for maintenance. Extension is not feasible
Elm Creek	33.14009 -96.42500	Y	30	485	Adequate. Extension is not feasible
Lakeland Park	33.10315 -96.44589	Y	60	478	Adequate. Extension is not feasible
Tickey Creek	33.09562 -96.47443	Y	60	478	Adequate. Extension is not feasible
Pebble Beach	33.08451 -96.45275	Y	45	481	Adequate. Extension is not feasible
Little Ridge	33.06624 -96.45500	Y	60	478	Adequate. Extension is feasible.
Mallard Park	33.04860 -96.42698	Y	30	478	Adequate. Extension is feasible.
Lavonia Park	33.04178 -96.44335	Y	60	478	Adequate. Extension is feasible.
Clear Lake	33.05900 -96.48810	Y	45	478	Adequate. Extension is feasible.
Bratonia Park	33.11063 -96.52019	Y	20	490	Fair. Extension is not feasible
Highland Park	33.10782 -96.54063	Y	30	490	Fair. Extension is not feasible
Brockdale Park	33.07344 -96.54531	Y	30	484	Extension is not feasible
Collin Park	33.05104 -96.53057	Y	85	478	Fair. Extension is feasible.
East Fork Park	33.03705 -96.51466	Y	105	478	Park closed. Extension is feasible.
Avalon Park	33.04276 -96.49807	Y	60	474	Excellent. Park closed on weekends.

Table 2. Harvest regulations for Lavon Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Striped	5	18-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 3. Stocking history of Lavon Reservoir, Texas. FRY = fry; FGL = fingerling; AFGL = advanced fingerling; ADL = adults; UNK = Unknown.

Year	Number	Size	Year	Number	Size
<u>Threadfin Shad</u>			<u>Florida Largemouth Bass</u>		
1980	8,250	AFGL	1988	67,226	FGL
<u>1984</u>	<u>2,000</u>	AFGL	1988	361,652	FRY
Species Total	10,250		1997	250,800	FGL
<u>Blue Catfish</u>			2004	539,664	FGL
1989	214,259	FGL	2005	535,577	FGL
1997	214,106	FGL	<u>2017</u>	<u>84,309</u>	FGL
<u>1998</u>	<u>214,588</u>	FGL	Species Total	1,839,228	
Species Total	642,953		<u>Largemouth Bass</u>		
<u>Channel Catfish</u>			1954	1,027,000	FRY
1954	20,000	AFGL	<u>1968</u>	<u>177,100</u>	UNK
<u>1971</u>	<u>26,700</u>	AFGL	Species Total	1,204,100	
Species Total	46,700		<u>Mixed Largemouth Bass</u>		
<u>Palmetto Bass</u>			1988	98,860	FGL
1976	39,200	FGL	<u>White Bass</u>		
<u>Striped Bass</u>			1957	330	ADL
1989	213,826	FGL	<u>Walleye</u>		
1994	428,402	FGL	1976	86,000	FRY
2004	19,241	FGL			
2005	107,008	FGL			
2006	216,086	FGL			
2007	339,114	FGL			
<u>2008</u>	<u>216,090</u>	FGL			
Species Total	1,539,767				

Table 4. Objective-based sampling plan components for Lavon Reservoir, Texas 2018–2019.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE–Stock	RSE–Stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Age-and-growth	Age at 14 inches	$N = 13$, 13.0 – 14.9 inches
	Condition	W_r	10 fish/inch group (max)
Bluegill ^a	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$
Gizzard Shad ^a	Abundance	CPUE–Total	RSE ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$
	Prey availability	IOV	$N \geq 50$
<i>Trap netting</i>			
Crappie	Abundance	CPUE-stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	$N = 50$
	Condition	W_r	10 fish/inch group (max)
White Crappie	Age-and-growth	Age at 10 inches	$N = 13$, 9.0 – 10.9 inches
<i>Gill netting</i>			
Blue Catfish	Abundance	CPUE–stock	RSE-Stock ≤ 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
White Bass	Abundance	CPUE-total	None, practical effort

^a No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

Table 6. Survey of aquatic vegetation, Lavon Reservoir, Texas, 2010–2018. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2010	2014	2018
Native submersed	10 (<0.1)	0.0	0.0 (0)
Native floating-leaved	0.0	0.0	41 (0.2)
Native emergent	44 (0.2)	0.0	2 (<0.1))

Table 7. Percent directed angler effort by species for Lavon Reservoir, Texas, 2017–2018. Survey periods were from 1 June through 31 May.

Species	2017/2018
Catfish	28.4 (12)
White Bass	8.6 (20)
Freshwater Drum	0.1 (155)
Sunfishes	2.0 (46)
Largemouth Bass	9.8 (17)
Crappie	39.0 (12)
Anything	12.0 (18)

Table 8. Total fishing effort (h) for all species and total directed expenditures at Lavon Reservoir, Texas, 2017-2018. Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Creel statistic	2017/2018
Total fishing effort	254,104 (12)
Fishing from bank	122,312 (14)
Fishing from boat	131,791 (13)
Total directed expenditures	\$975,133 (21)

Gizzard Shad

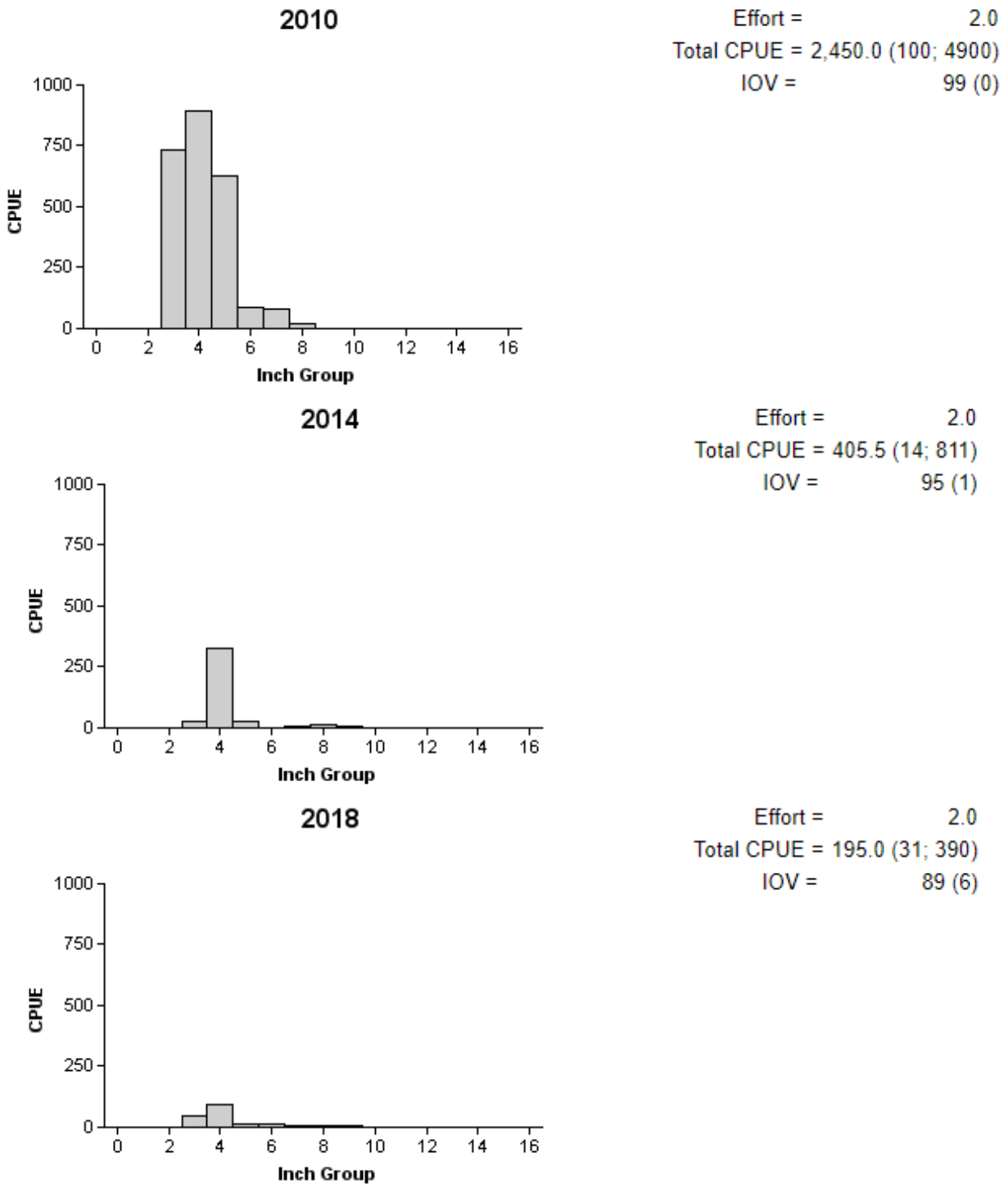


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lavon Reservoir, Texas, 2010, 2014, and 2018.

Bluegill

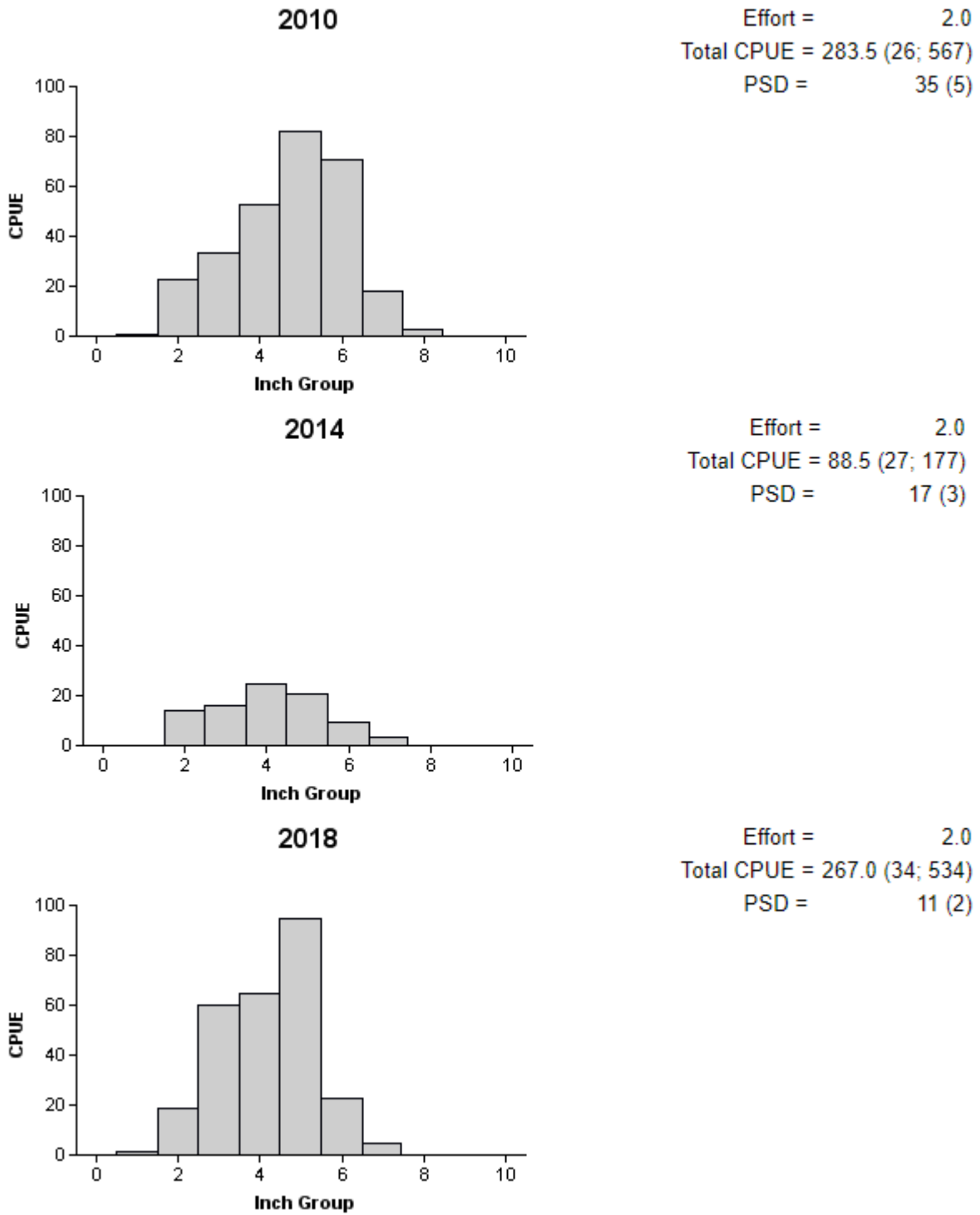


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lavon Reservoir, Texas, 2010, 2014, and 2018.

Channel Catfish

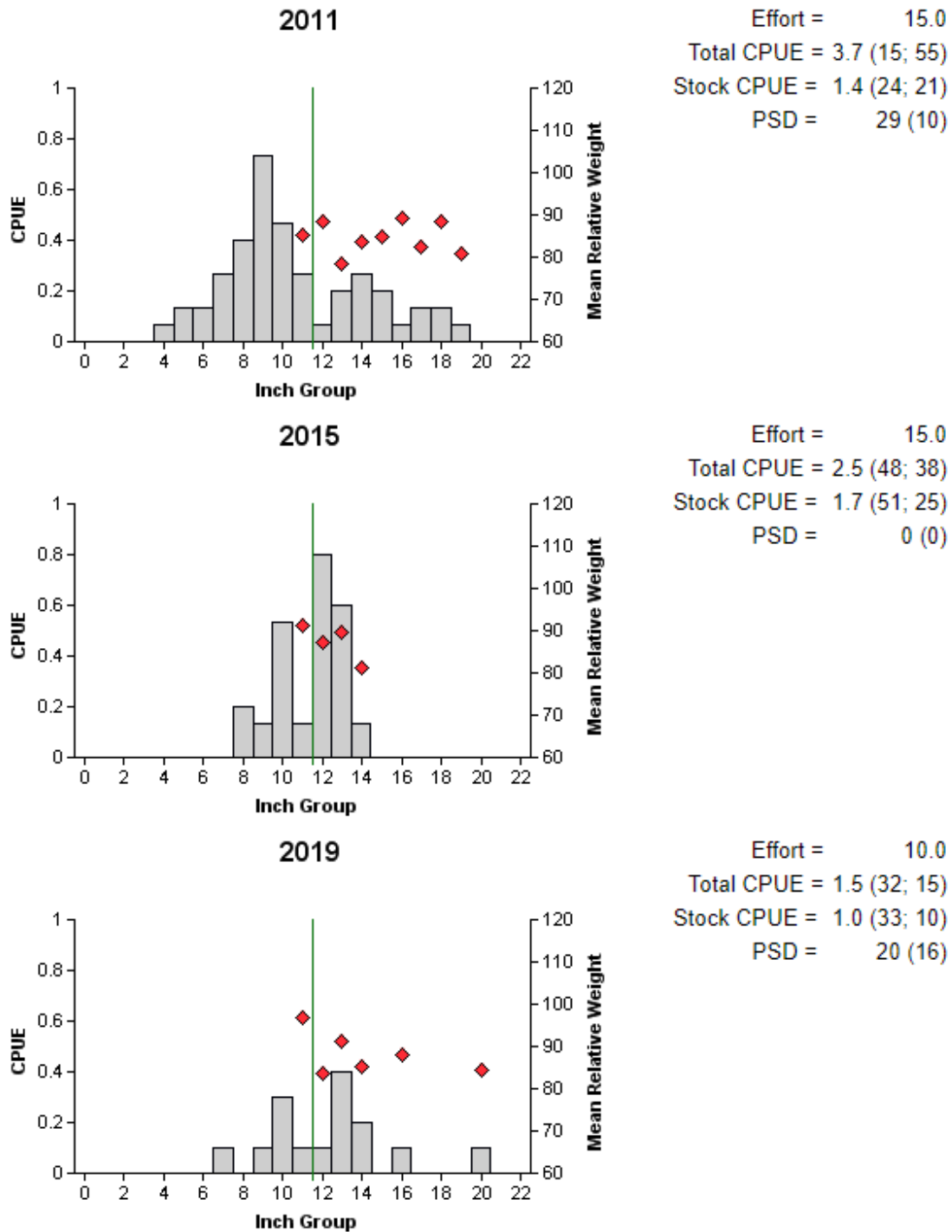


Figure 4. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lavon Reservoir, Texas, 2011, 2015, and 2019. Vertical line indicates minimum length limit.

Blue Catfish

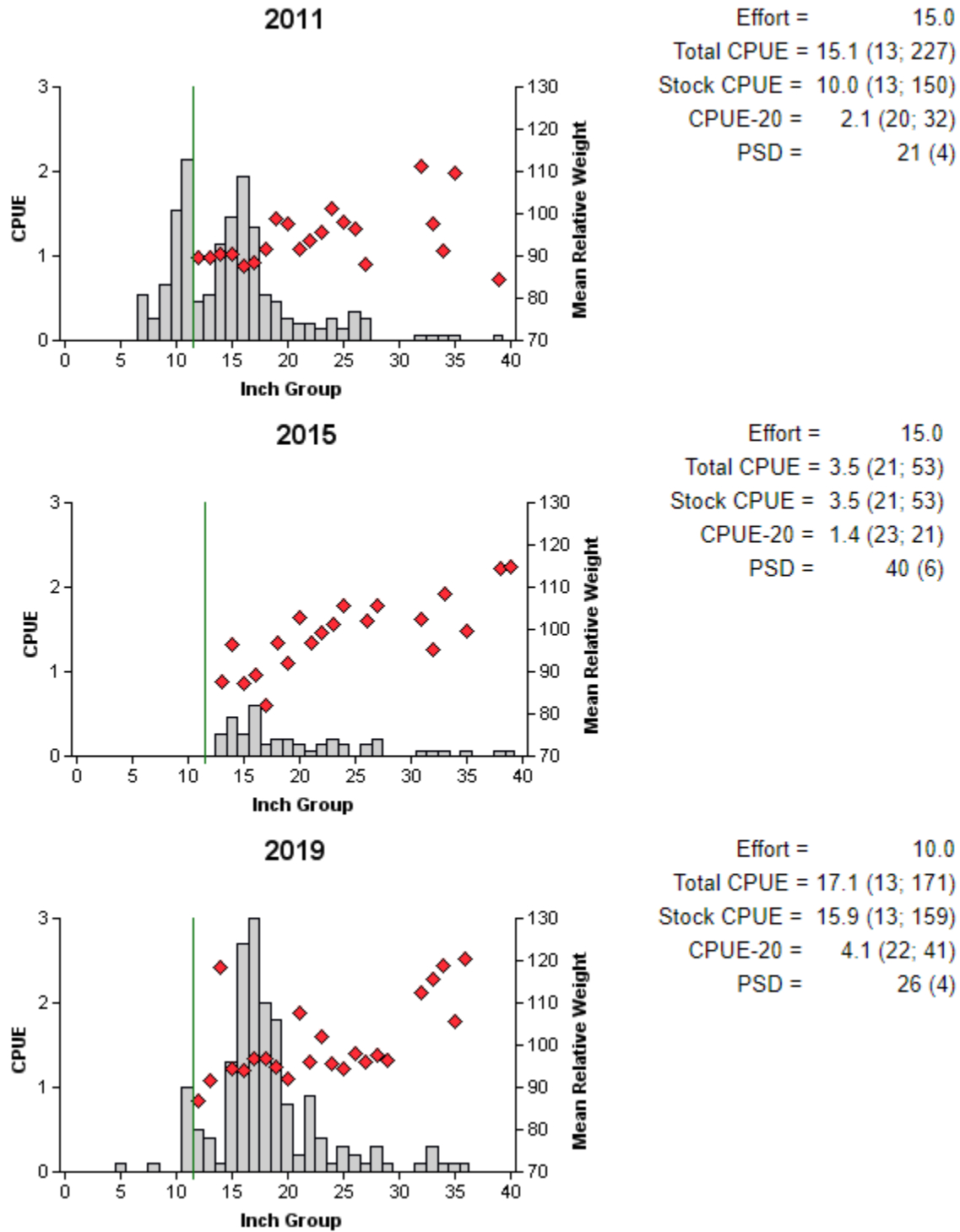


Figure 5. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lavon Reservoir, Texas, 2011, 2015, and 2019. Vertical line indicates minimum length limit.

Table 9. Creel survey statistics for Blue Catfish and Channel Catfish at Lavon Reservoir, Texas, from June 2017 through May 2018. Catch rate (fish/h) is for anglers targeting catfish and total harvest is the estimated number of Blue Catfish and Channel Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2017/2018
Surface area (acres)	21,400
Directed effort (h)	72,237.9 (12)
Directed effort/acre	3.4 (12)
Catch rate (fish/h)	0.7 (35)
Total harvest	32,153.7 (28)
Blue Catfish	22,456.1 (42)
Channel Catfish	9,697.6 (58)
Harvest/acre	1.5 (28)
Percent legal released	23

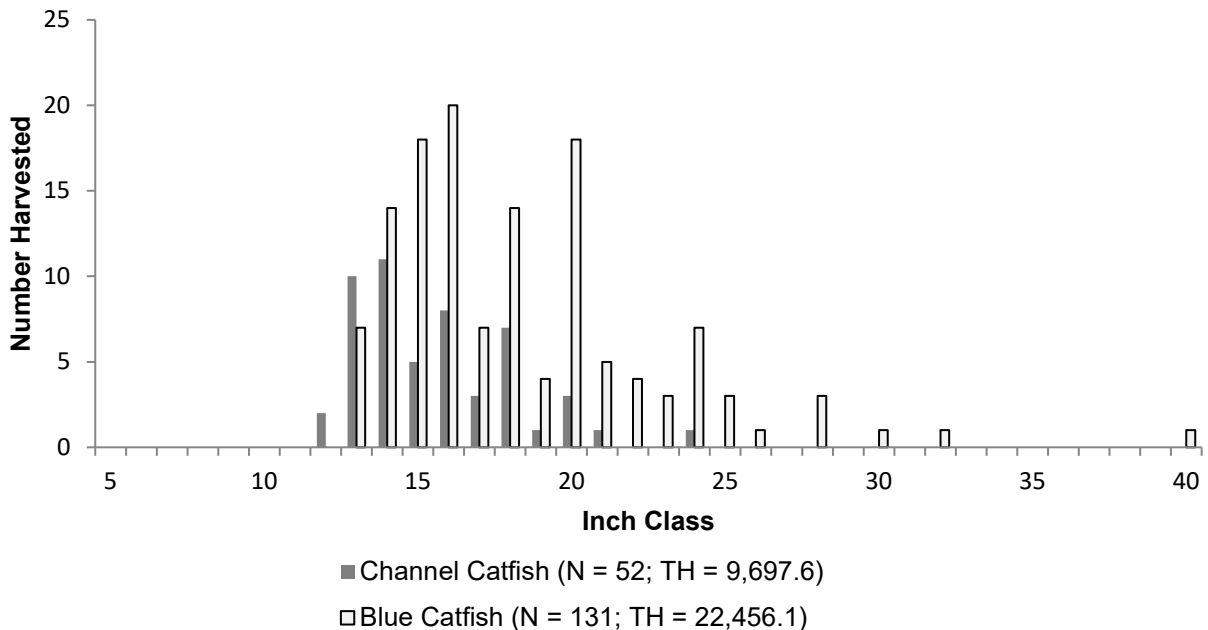


Figure 6. Length frequency of harvested Blue Catfish and Channel Catfish observed during creel surveys at Lavon Reservoir, Texas, June 2017 through May 2018, all anglers combined. N is the number of harvested catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass

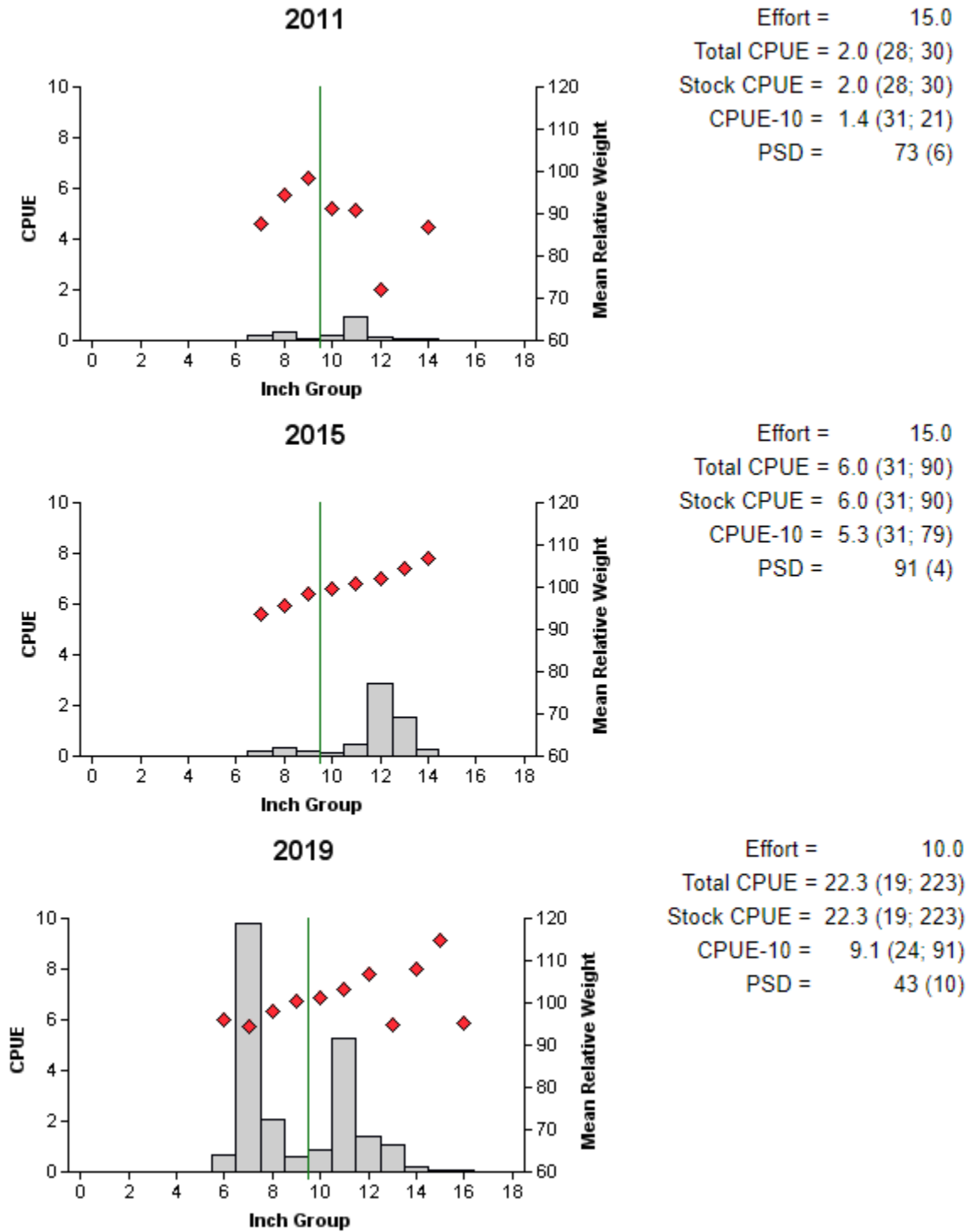


Figure 7. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lavon Reservoir, Texas, 2011, 2015, and 2019. Vertical line indicates minimum length limit.

Table 10. Creel survey statistics for White Bass at Lavon Reservoir, Texas, from June 2017 through May 2018. Catch rate (fish/h) is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year
	2017/2018
Surface area (acres)	21,400
Directed effort (h)	21,877.01 (20)
Directed effort/acre	1.02 (20)
Catch rate (fish/h)	2.8 (24)
Total harvest	25,295.4 (31)
Harvest/acre	1.2 (31)
Percent legal released	15

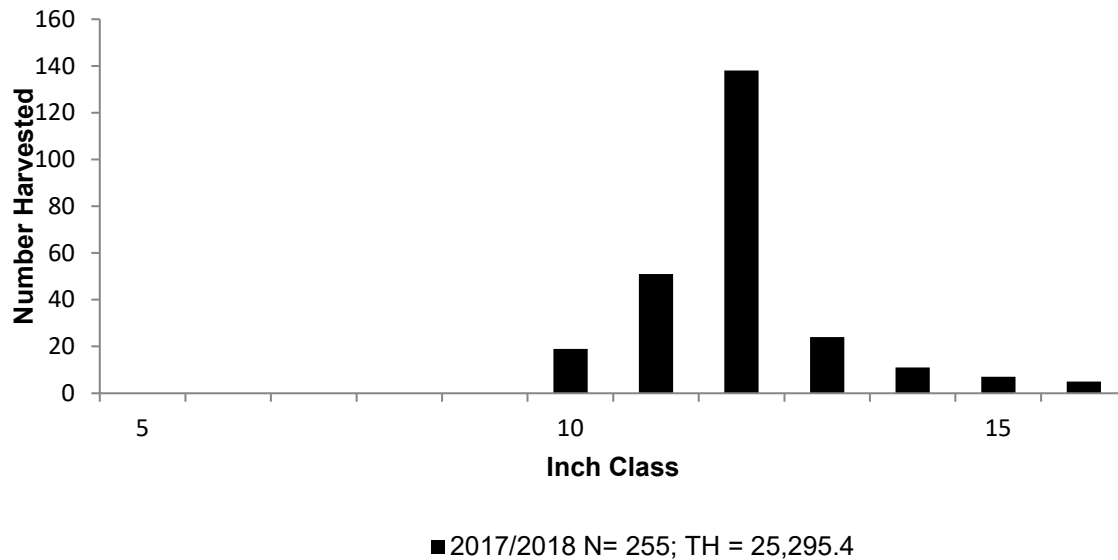


Figure 8. Length frequency of harvested White Bass observed during creel surveys at Lavon Reservoir, Texas, June 2017 through May 2018, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

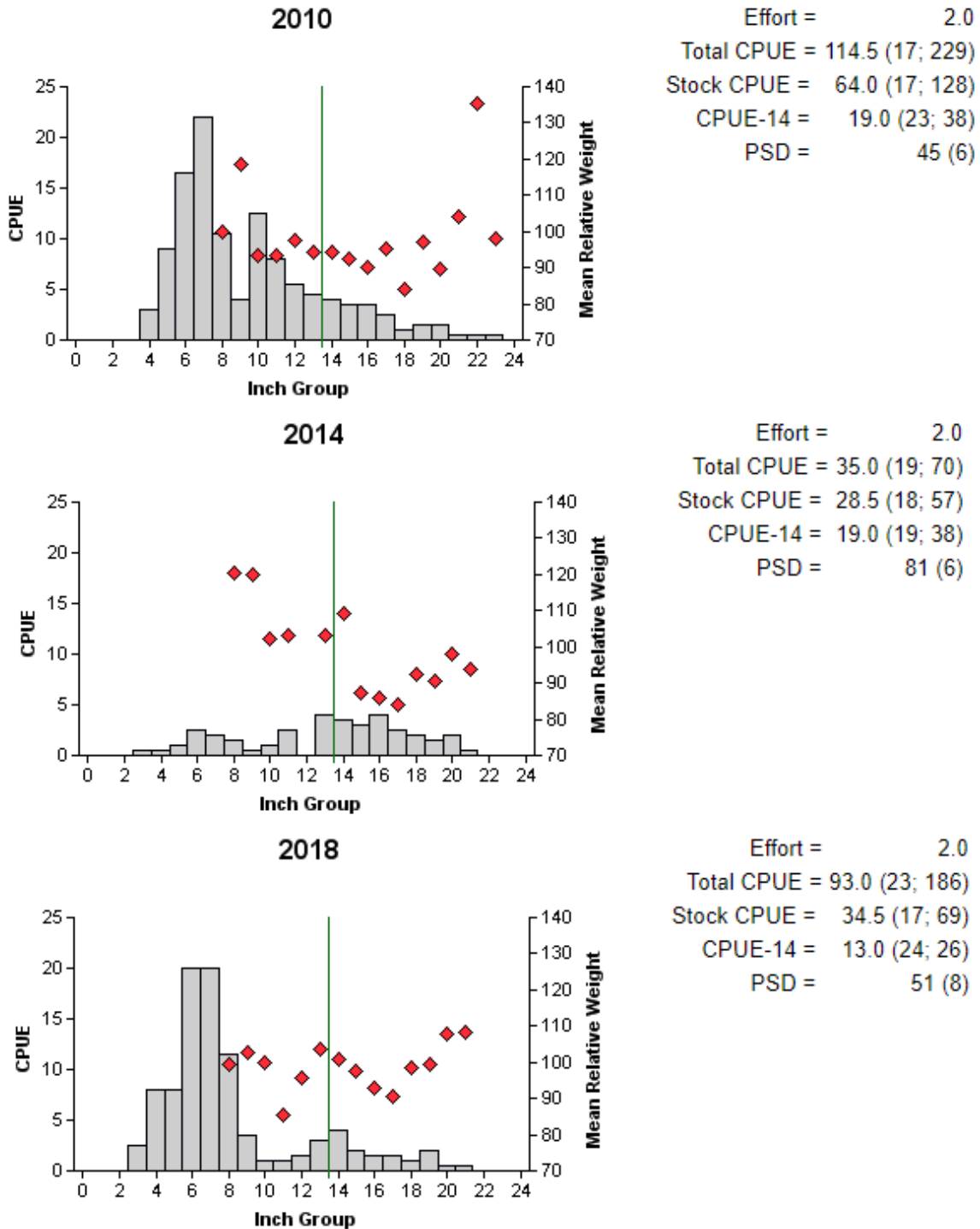


Figure 9. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lavon Reservoir, Texas, 2010, 2014, and 2018. Vertical line indicates minimum length limit.

Table 11. Creel survey statistics for Largemouth Bass at Lavon Reservoir, Texas, from June 2017 through May 2018. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. Relative standard errors (RSE) are in parentheses.

Statistic	2017/2018
Surface area (acres)	21,400
Directed angling effort (h)	
Tournament	1,794.9 (56)
Non-tournament	23,152.6 (17)
All black bass anglers combined	24,948 (17)
Angling effort/acre	1.2 (17)
Catch rate (fish/h)	0.4 (50)
Harvest	
Non-tournament harvest	1,198.6 (175)
Harvest/acre	0.1 (175)
Tournament	115.1 (658)
Percent legal released (non-tournament)	79

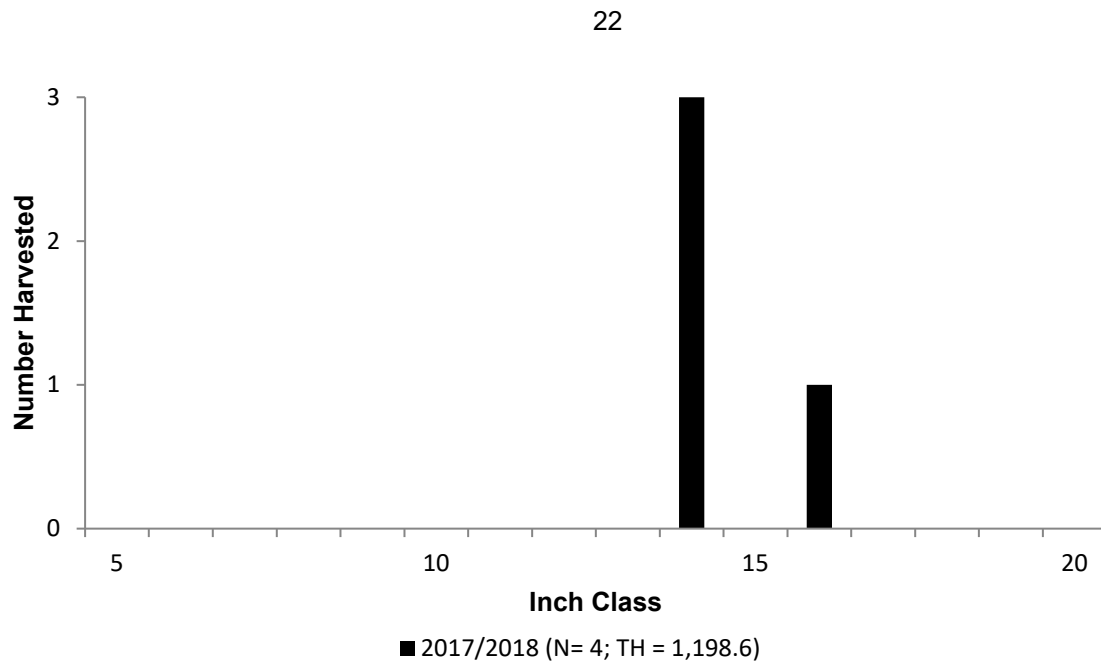


Figure 10. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Lavon Reservoir, Texas, June 2017 through May 2018, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period.

Crappie

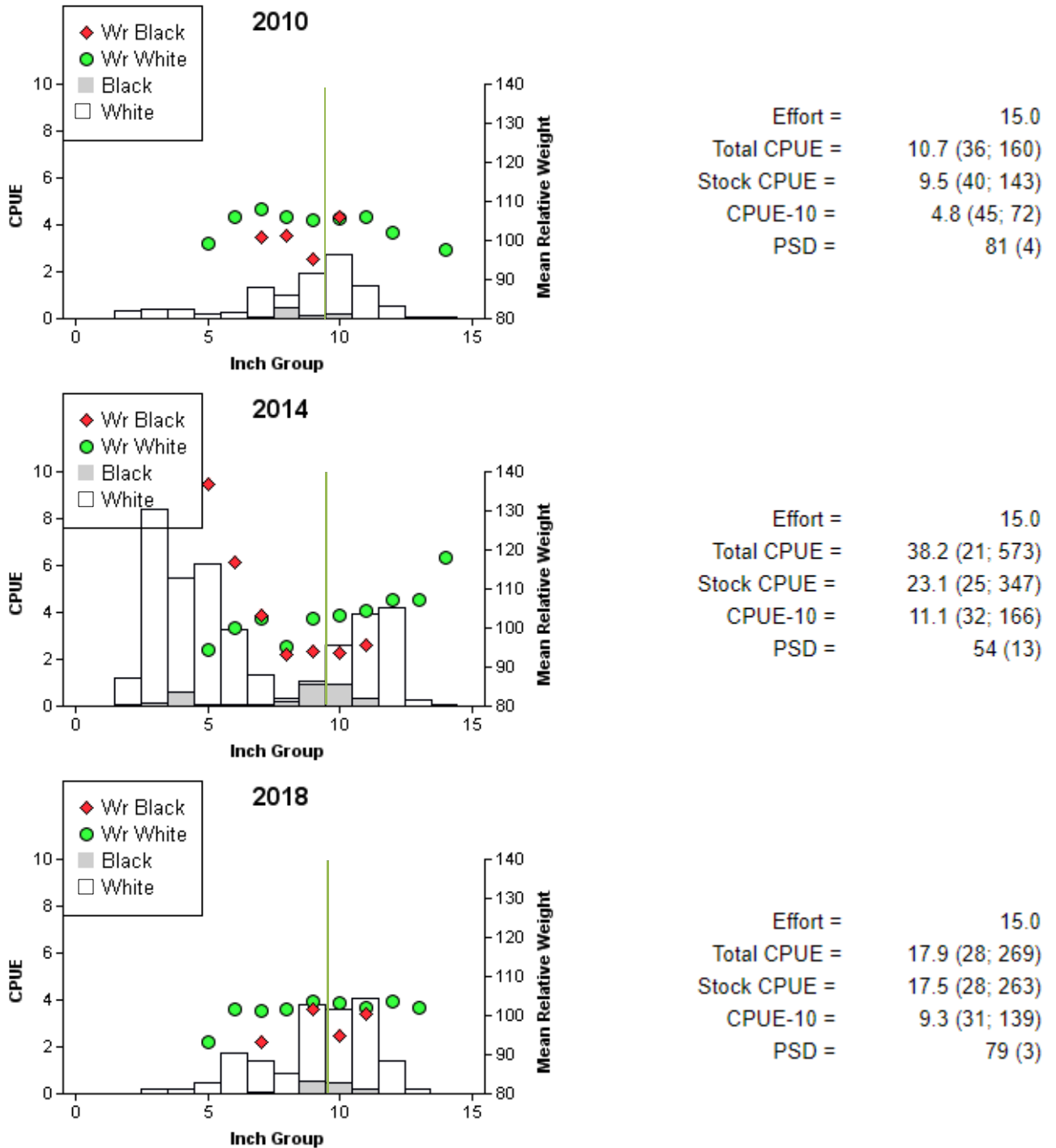


Figure 11. Number of Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Lavon Reservoir, Texas, 2010, 2014, and 2018. Vertical line indicates minimum length limit.

Table 12. Creel survey statistics for crappie at Lavon Reservoir, Texas, from June 2017 through May 2018. Catch rate (fish/h) is for anglers targeting White Crappie and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year
	2017/2018
Surface area (acres)	21,400
Directed effort (h)	99,183.0 (12)
Directed effort/acre	4.6 (12)
Catch rate (fish/h)	2.9 (25)
Total harvest	82,808.3 (26)
Harvest/acre	3.4 (26)
Percent legal released	10

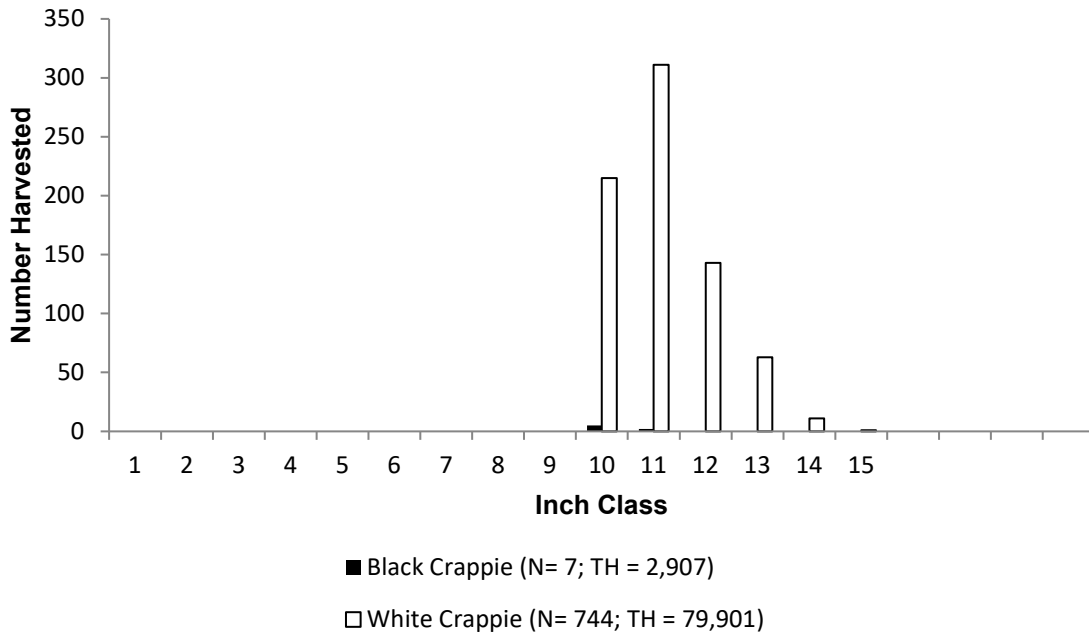


Figure 12. Length frequency of harvested crappie observed during creel surveys at Lavon Reservoir, Texas, June 2017 through May 2018, all anglers combined. N is the number of harvested crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 13. Proposed sampling schedule for Lavon Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

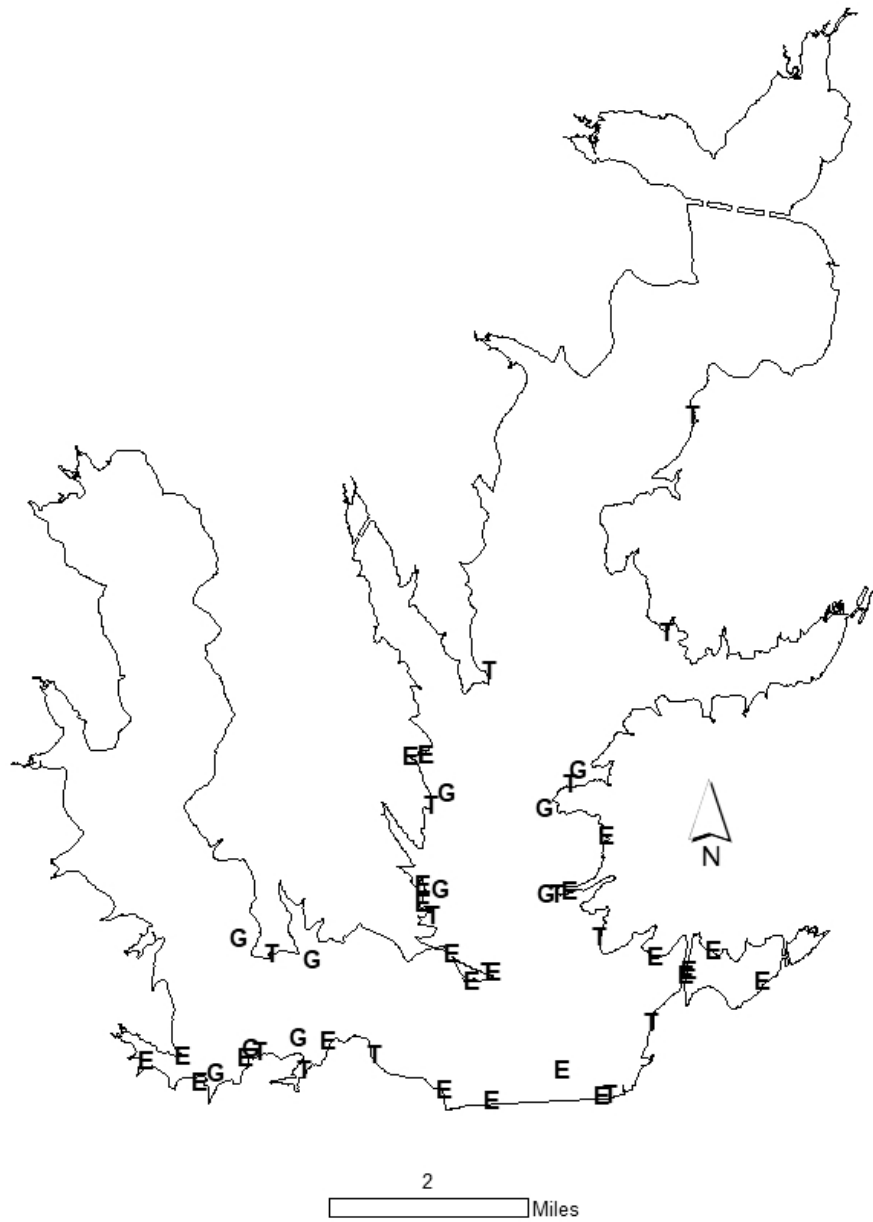
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Vegetation				S
Zebra Mussels	A	A	A	A
Electrofishing				S
Trap netting				S
Gill netting				S
Creel survey				
Report				S

APPENDIX A – Catch rates for all species from all gear types

Number (N) and catch rate (CPUE) (RSE in parentheses) of all target species collected from all gear types from Lavon Reservoir, Texas, 2018-2019. Sampling effort was 10 net nights for gill netting, 15 net nights for trap netting, and 2 hours for electrofishing.

Species	Gill Netting		Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					390	195.0 (31)
Threadfin Shad					108	54.0 (86)
Blue Catfish	171	17.1 (13)				
Channel Catfish	15	1.5 (32)				
White Bass	222	22.2 (19)				
Yellow Bass	83	8.3 (36)				
Green Sunfish					4	2.0 (69)
Warmouth					11	5.5 (37)
Orangespotted Sunfish					5	2.5 (50)
Bluegill					534	267.0 (34)
Longear Sunfish					170	85.0 (29)
Redear Sunfish					3	1.5 (73)
Largemouth Bass					186	93.0 (23)
White Crappie			250	16.67 (29)		
Black Crappie			19	1.27 (26)		

APPENDIX B – Map of sampling locations



Location of sampling sites, Lavon Reservoir, Texas, 2018-2019. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was near full pool at time of sampling.

APPENDIX C – Historical Catch Rates

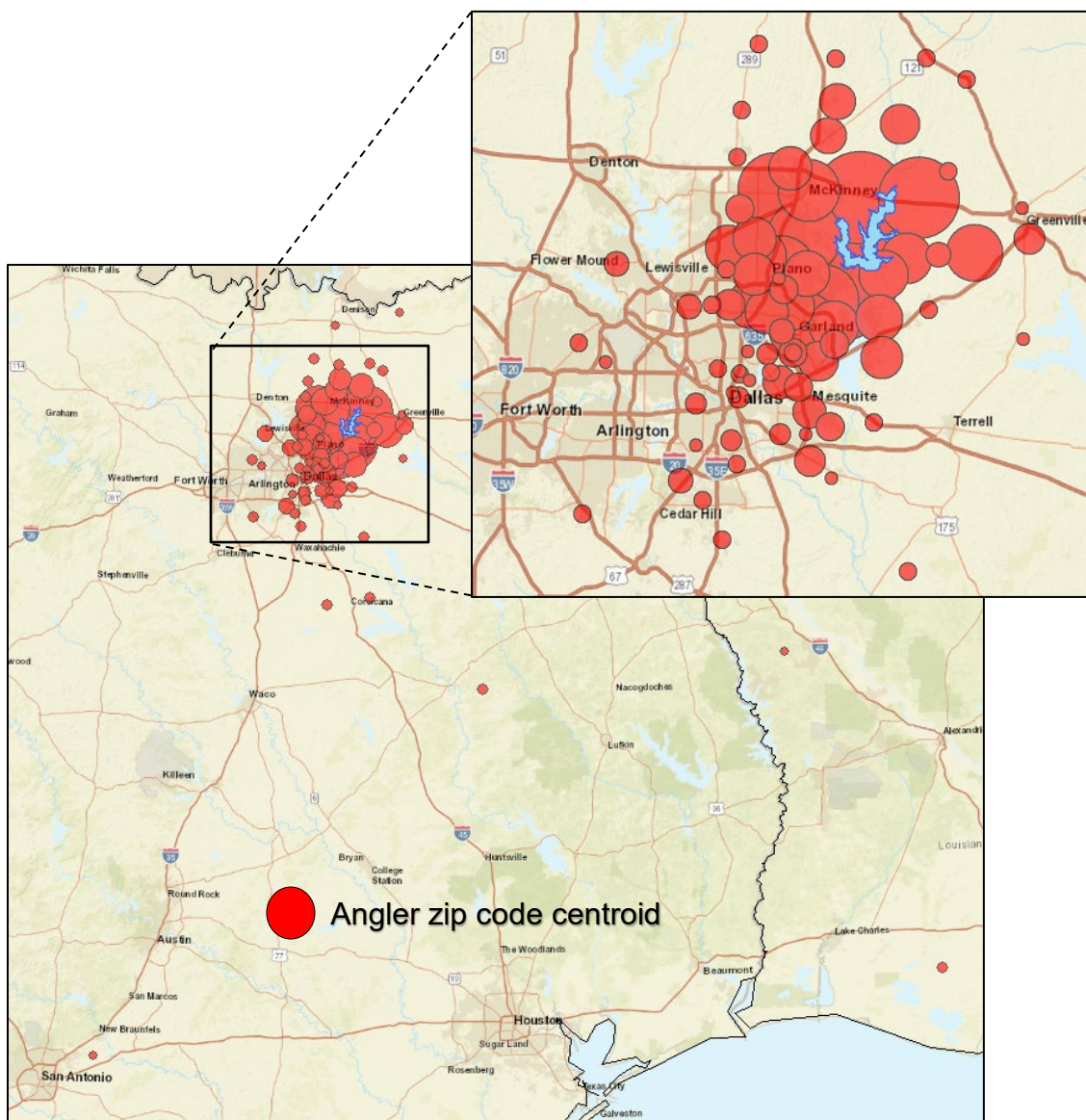
Historical catch rates of targeted species by gear type for Lavon Reservoir, Texas, 1996 to 2018.

Gear	Species	Year								Avg.
		1996 ^a	1999	2002 ^b	2006 ^b	2009	2010 ^b	2014 ^b	2018 ^b	
Gill Netting (fish/net night)	Blue Catfish	1.1	8.3	14.8	16.7	15.5	15.1	3.5	17.1	11.5
	Channel Catfish	1.9	2.5	0.9	1.5	1.3	3.7	2.5	1.5	2.0
	Flathead Catfish	0.0	0.0	0.0	0.1	0.0	0.1		0.0	0.0
	White Bass	3.8	3.8	2.5	0.1	11.8	2.0	6.0	22.2	6.5
	Striped Bass	1.3	1.5	0.1	0.1	0.1	0.2		0.0	0.5
	Yellow Bass								8.3	8.3
Electrofishing (fish/hour)	Gizzard Shad	202.5	215.5	209.5	208.0		2450.0	405.5	195.0	615.2
	Threadfin Shad	120.5	330.0	58.5	832.0		170.5	14.0	54.0	225.6
	Green Sunfish	1.5	4.0	0.0	0.0		6.5	4.0	2.0	2.6
	Warmouth	0.5	3.0	2.5	8.0		14.5	4.5	5.5	5.5
	Orangespotted Sunfish	0.0	0.0	2.5	0.0		1.0	16.0	2.5	3.1
	Bluegill	33.0	40.5	79.0	91.0		283.5	88.5	267.0	126.1
	Longear Sunfish	4.0	88.0	66.5	65.5		244.5	85.5	85.0	91.3
	Redear Sunfish	0.0	0.0	0.0	1.0		3.0	0.0	1.5	0.8
Largemouth Bass	9.0	66.0	18.5	43.0		114.5	35.0	93.0	54.1	
Trap Netting (fish/net night)	White Crappie	3.5	17.8	17.5	22.2		9.8	34.8	16.7	17.6
	Black Crappie	0.0	0.0	0.0	0.1		0.9	3.4	1.3	0.8

^a Trap netting was conducted in January 1997.

^b Gill netting was conducted in the spring of the following year.

APPENDIX D – Map of Creel Angler Zip Codes



Location, by ZIP code, and frequency of anglers that were interviewed at Lavon Reservoir, Texas, during the June 2017 through May 2018 creel survey. Dot size indicates relative frequency of angler visits ($N=841$).



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